methods used were less perfect than those in use to-day but even assuming that the analyses are reasonably accurate, the varying proportions and the various ingredients in the case of different species and different analyses are such that it is impossible to discern any rule or law governing their absorption by the plant. It is evident that certain mineral constituents are necessary for the plant's growth, but the minimum amount required of individual elements or the relative amounts of various elements apparently depend on a number of variables, such as species and race of plant, the soil, the season, the rainfall, the state of cultivation, etc., to such an extent that it is doubtful whether or not any sort of rule governing these proportions can ever be formulated. About all we can say is that certain elements are necessary for the normal growth of the plant and either the plant obtains these at the proper time or it suffers injury or death.

Small wonder that the older chemists failed to find the rule and all credit to them that they did ascertain the main fact.

Considering plants of all sorts, and all parts of plants, silicon is the greatest variable of all. It is invariably present but only in small amount, even to a fraction of one per cent. in fruits and edible grass seeds (grain), whereas in the stalks of the same plants it may constitute as much as seventy-five per cent. of the ash. In the light of these facts, it has been looked upon by some authors as a material of construction (the first and most natural thought) rather than as a physiologically functioning substance. This view receives some confirmation from those obvious cases in which silica serves as a structural support, as in the scouring rush and diatoms. There can be no doubt that plants acquired the silica habit early in their evolutionary history and it yet may be found to function physiologically, osmotically or structurally. It is difficult to think of an active, surviving, plant organism absorbing and storing up such a substance or any substance which has and can have no real and positive use in its life cycle. Unless silicon functions in some way in plant metabolism or serves as a building material, it is most difficult to explain the high relative portion of this element in the grasses and scouring rush, the moderate amounts in Artemesia and the almost negligible quantity present in Prunus.

It is interesting to visualize the activities of the growing root tip as it projects itself among the sand grains, moving under the reactions of the various tropisms in such wise that the weal of the growing plant is conserved; turning as necessity arises first in one direction, then in the other, but on the whole maintaining its direction, since there are no serious obstructions in the dune soil; wedging its way molelike underground, expanding, holding fast; neglecting grains of silica, lying close to potash silicates, absorbing chance molecules of calcium bicarbonate and phosphates, furnishing the chemical means if need be, of bringing the insoluble substance it requires into solution; keeping the cell pumps going to furnish the water supply to the plant in time of rain or drought; a very center of ceaseless, slow, sure activity, in which all the forces of nature seem to be at work to maintain a useless bitter plant.

W. D. RICHARDSON

CHICAGO, ILL.

THE UTAH ACADEMY OF SCIENCES

THE thirteenth annual convention of the Utah Academy of Sciences was held in the physics lecture room of the University of Utah at Salt Lake City on April 2 and 3, 1920.

At the business meeting at the close of the session, April 3, the following members were elected to fellowship in the Academy: O. W. Israelson, Utah Agricultural College, Logan; T. B. Brighton, University of Utah, Salt Lake City, and R. A. Hart, Springville.

The following were elected to membership: Dr. E. L. Quinn, University of Utah; Dr. E. E. Erricksen, University of Utah; Orin A. Ogilvie, University of Utah; Wm. Z. Terry, Ogden; Geo. P. Unseld, Salt Lake City, and Albert S. Hutchins, Springville.

The constitution was amended raising the annual dues to two dollars, effective for the present year.

A resolution, urging the United States Senate and House Committees on Civil Service, to an early adoption of the report of the Congressional Commission on the reclassification of government employees was unanimously adopted.

The following officers were elected for the ensuing year:

President, Carl F. Korstian, U. S. Forestry Service, Ogden.

First Vice-president, Dr. Frank L. West, Utah Agricultural College, Logan.

Second Vice-president, Hyrum Schneider, University of Utah, Salt Lake City.

Councillors, Dr. M. C. Merrill, Utah Agricultural College, Logan; Carl F. Eyring, Brigham Young University, Provo, and H. R. Hagan, Salt Lake City.

At the Friday evening session, the program consisted of a symposium on the subject of "The constitution of matter" and consisted of the following papers:

The theory of the constitution of matter: Dr. Orin Tugman, University of Utah, president of the academy.

The oil drop method of measuring the electric charge: Carl F. Eyring, Brigham Young University.

The electron theory of the conduction of electricity: Dr. Frank L. West, Utah Agricultural College.

The theory of valencies: Dr. W. D. Bonner, University of Utah.

The relativity theory: E. W. Pehrson, University of Utah.

The Einstein theory: Geo. P. Unseld, West High School, Salt Lake City.

Matter from the point of view of a personalistic philosophy: W. H. Chamberlain, University of Utah.

The program for the Saturday morning session was as follows:

Capacities of soils for irrigation water: O. W. Israelson, Utah Agricultural College.

The breeding of canning tomatoes: Dr. M. C. Merrill and Tracy Abell, Utah Agricultural College.

The value of farm manure for Utah soils: Dr. F. S. Harris, Utah Agricultural College.

Research work of the experiment station of the Bureau of Mines: Thomas Varley, U. S. Bureau of Mines, University of Utah.

Hydrometallurgy as applied to the mineral industry: Clarence A. Wright, U. S. Bureau of Mines, University of Utah.

Oil shales and their economic importance: Martin J. Gavin, U. S. Bureau of Mines, University of Utah.

Pyrometallurgy and its future possibilities: John C. Morgan, U. S. Bureau of Mines, University of Utah.

Chemistry and its relation to metallurgy: Edward P. Barrett, U. S. Bureau of Mines, University of Utah.

Complementary luncheon to the members of the academy by the University of Utah at the dining hall. At the luncheon, an address was given by President John A. Widtsoe, University of Utah.

At the afternoon session the following papers were read:

A capillary transmission constant and methods of measuring it: Willard Gardner, Utah Agricultural College.

Mid-tertiary deformation of western North America: Hyrum Schneider, University of Utah.

Electrical conductivity of thin metal films: Dr. Orin Tugman, University of Utah.

Is disinfection a reaction of the first order? Dr. L. F. Shackell, University of Utah.

Some problems in daylight illumination: C. Arthur Smith, East High School, Salt Lake City.

Equilibrium conditions in the system calcium sulphate-manganous sulphate-water: A. G. Kline and Dr. T. B. Brighton, University of Utah.

Standardization from constant boiling hydrochloric acid: J. T. Bonner and Dr. T. B. Brighton, University of Utah.

Comparison of the action of potassium cyanide and sodium cyanide on alkyl halides: W. D. Kline and Dr. W. D. Bonner.

The determination of arsenic as lead arsenate: A. E. Anderson and Dr. T. B. Brighton, University of Utah.

C. Arthur Smith,
Corresponding Secretary

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